

cessfully applied as to give some hope that this or some other chemical process will aid us in this important question.

The author gives some useful details and statistics regarding the "tinned meat" process. This well-known method depends upon the exclusion of air by the substitution of steam, and in the consequent destruction of organic germs. So far as mere preservation is concerned, it has undoubtedly proved a great success, and has already been of some benefit to us; but the long cooking process hitherto employed to expel the air has so destroyed the texture of the meat as to have rendered its use unpopular in spite of the efforts of enthusiasts to force the over-cooked product upon an unwilling public. So soon as the very primitive plan of heating the tins in a bath of chloride of calcium for three or four hours be replaced by one exhausting the air and replacing it by steam at a high temperature successively, and occupying no more than half an hour, then will the tinned meat process prove a real success, and possess many advantages over all others. Mr. Manley has done good service by his description of what has been attempted, and though he suggests but little himself, he may induce some of his readers to experiment upon a matter of such national importance.

The paper on "Sugar Refining" is one of the best contributions in the series, written by one not only an able chemist but also a thoroughly practical sugar refiner. As a clear, accurate, and scientific exposition of an important industry it serves as an example of what such contributions should be. Its only fault is that it is somewhat too brief. After the usual historical account of the industry, the author explains the more important properties of sugar, and shows how these are made use of in the various stages of extraction and purification from the cane and the beet. The author has not considered it within his province to refer to the serious injury to our sugar manufacturers by the heavy export premiums paid by the French nation on all high class products exported to this country. Doubtless so soon as the French financiers have completely extinguished the manufacture of loaf and other high class sugars in England, they will then remove the export premiums, being full well assured that the memory of the ruined English sugar refiners will for a long time at least deter our capitalists from competing with French refineries. Though the "beet" produces one-third of the total amount of sugar grown, and has proved of such value to agriculture on the Continent, yet hitherto the growth of beets for sugar manufacturing purposes has not proved a success in our own country. Nor indeed is it likely to prove remunerative so long as it pays better to grow beef and mutton. In concluding this brief notice we cannot refrain from once more praising the author's valuable—though brief—contribution.

Mr. Evans contributes a short article on dairy produce. He gives some interesting information upon the factory system of cheese-making introduced with so much success into England within the last few years. It is to be regretted that Mr. Evans has given no information upon the mode of preparing the French, Italian, and Swiss cheeses so much appreciated by connoisseurs.

The article on "Brewing and Distilling" is a useful

contribution on two important industries, by one evidently well acquainted with them. Some valuable statistics are given, showing the vast development which has taken place in the production of alcoholic beverages in the United Kingdom. According to the author, on March 31, 1873, there were 31,010 brewers, 144,425 dealers and retailers of beer. The income derived from beer in 1873 amounted to 8,027,408*l.*, a sum which fully explains the hesitation of the present Government to please the agricultural interest by the removal of the malt-tax. In addition to these thirty thousand brewers, of whom, however, only some three thousand are licensed common brewers—there are, it appears, 318 distillers and rectifiers, producing 30,644,750 gallons of spirit, yielding a revenue of 14,895,769*l.*; the number of licences issued in 1875 to persons dealing in and retailing spirits was 138,845. The author calculates that in the brewing and distilling industries, and in those originated and sustained by them, there is a capital of two hundred millions invested. Without following Sir Wilfrid Lawson in all his statements, one cannot but view an annual consumption of twenty-eight to thirty millions of gallons of spirit as a most serious feature in our social life.

Those interested in this matter and desirous of obtaining a general knowledge of the technical processes, will with advantage consult Mr. Pooley's articles. In concluding this notice of the volume before us we must congratulate the publisher and the editor on their success in obtaining the aid of writers so well acquainted with their respective subjects.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

Sea Fisheries

MR. HOLDSWORTH, at the close of his animadversions (*NATURE*, vol. xv. p. 23) on the address I recently delivered in the Biological Section of the British Association at Glasgow, says that he does not know on what evidence I grounded my belief in the decline of our sea-fisheries. I am therefore anxious to state that the evidence to which I trusted in what I then said was mainly, if not entirely, that collected by the Royal Commission of which he was the hard-working secretary. The kindness of my good friend in giving me private notice of his intention to make his comments public enables me the more promptly to furnish a reply to them, and for so doing he has my best thanks.

I do not pretend to have read through the whole of the 1,500 and odd somewhat closely-printed folio pages which form the two "Blue-books" embodying the labours of that Commission. But soon after they appeared—about ten years ago—I looked into them sufficiently, as I thought, to give me a fair notion of their contents. Whether that notion was mistaken your readers will be better able to judge by the time I have done. When I wrote my address I had not these books by me. I have since refreshed my memory by consulting them. I find that deep as was the impression left by my first examination of them it is now still deeper, and were I to write my address over again I should express myself in far stronger terms.

The second and most bulky volume of these blue-books contains the "Minutes of Evidence" taken before the Sea-Fisheries Commission, and reports the 61,831 questions and answers put by or given to the Commissioners. At first the attempt to find the particular needles one may be seeking in this immense bottle of hay seems hopeless. But fortunately the volume (as most blue-books are) is furnished with a copious index, extending to 29

pages folio, and by help of this I beg leave to submit to Mr. Holdsworth and your readers the following results.

The Commissioners took evidence at eighty-six places (Billingsgate and London counting separately), which, for convenience' sake, I will call "stations." Now it appears that of these eighty-six stations evidence was offered at twenty-two, showing an *increase* in the supply of fish generally, and evidence showing a *decrease* at forty-three, or exactly half of the whole number. But at thirteen of these stations the evidence was conflicting. Deducting, therefore, that number from each side, we have thirty stations where the evidence was solely for the decrease and only nine for the increase, or a clear majority of twenty-one stations for the former. It also appears (unless my arithmetic is at fault) that of the answers given to the Commissioners at these several places 250 showed an increase, and 605 a decrease. If, then, my opinion on this subject is so erroneous as Mr. Holdsworth asserts, it is one entertained by a good many people who know more of fishery matters than I do.

If, further, we analyse the evidence as to various kinds of fishes the results will not be very different. These will be best stated in a tabular form.

Kind of Fishes.	No. of Stations showing					
	Increase.	No falling off.	Decrease.	Total Disappearance.	Conflicting Evidence.	Clear Majority for Decrease.
Bream	1	—	—	—	—	—
Brill	—	—	2	—	—	2
Cod and Ling	9	—	42	—	5	38
Dogfish	—	—	2	—	—	2
Haddock	12	—	40	10	4	38
Hake	1	—	13	—	—	12
Halibut	—	—	2	—	—	2
Herring	24	—	41	—	13	17
Ling	1	—	8	—	1	7
Mackarel	4	—	11	—	2	7
Megrim	—	—	—	1	—	1
Pilchard	3	—	1	—	—	—
Plaice	3	—	2	—	—	—
Pollack	—	—	—	3	—	3
Skate	—	3	—	—	—	—
Smelt	—	—	2	—	—	2
Sole	6	—	15	—	2	9
Sprat	3	—	6	—	1	3
Turbot	7	—	9	—	—	2
Whiting	6	1	11	—	—	4

Thus out of these *twenty* kinds, *sixteen* show a positive decrease at more or fewer stations, and among them are some of the most important of our "food fishes"—cod and ling, haddock, hake, herring, mackarel, sole, sprat, and whiting.

Now I can imagine *three* objections being raised to the obvious inference from this table:—

First: that the witnesses for the decrease were untrustworthy.

Secondly: that the Irish stations are included among those showing decrease, and Irish fisheries are said to be languishing from causes which do not concern the present matter.

Thirdly: that even the non-Irish stations showing decrease are comparatively small and unimportant.

1. Without imputing any want of veracity to the witnesses for the decrease it is obvious that, as all fishermen have a pretty hard time of it, the proportion among them with a despairing turn of mind may be greater than among men who follow other callings, and that this may unconsciously tinge their testimony. So far, however, as my own experience goes, which is perhaps a very little way, I have found that the grumblers among fishermen commonly assign some specific cause for their complaints—be that cause real or imaginary. If so-and-so were or were not the case, they say, they would get on very well. Their assignment of any cause is purely a matter of opinion with them. Their statements as to the increase or decrease of fishes relate to a matter of fact within their own knowledge.

2. The proportion of Irish to non-Irish stations among those which show decrease is by no means excessive. Here it is:—Cod and ling, 13 out of 42; haddock, 12 out of 40; hake, 5

out of 13; herring, 10 out of 41; mackarel, 2 out of 11; sole, 1 out of 15; sprat, 1 out of 6; whiting, 1 out of 11. If the Irish stations were wholly disregarded the general deduction would not be materially affected.

3. Any one who has ever tried to learn the facts attending the process of extinction of animals, will soon find that the premonitory symptoms of approaching extirpation may be for a long time hardly recognisable at places where the particular species concerned is most abundant. It is first cut short on its borders, and scarcity begins and is most readily perceived at its outlying localities. Hence it is exactly in accordance with what always, or almost always happens, that the smaller and least important fisheries should first show signs of decline, if such decline is going on, as the above figures seem to prove. It may be years before the great trawling-grounds on various parts of the coast, or the Dogger Bank and the Silver Pit show unmistakable signs of exhaustion, but where is the take of fish inshore increasing or even stationary?

Having thus furnished the main grounds of my belief—for I do not wish to rely on the Report of the Committee of the House of Commons in 1833 (though that declared the Channel fisheries to have been in a declining state since 1815) further than to show it is a belief of long standing and held by practical men—I must proceed to make some other remarks on Mr. Holdsworth's indictment. First of all let me admit that he is of course literally accurate in his statement of the particular objects for which the Royal Commission of 1863 was appointed. But, as he also rightly remarks, its inquiry was extended, and indeed no one can glance at its blue-books without seeing that the inquiry covered far more ground than ever was scraped by a trawl. As I read the Instructions to the Commissioners, they were wide enough to permit any sort of inquiry into British Fisheries—even the seeking of a remedy for any decline in them if such was found to exist. But since my friend takes refuge behind the literal wording of the Queen's Commission, I may do the same with regard to the expressions used in my address. No doubt had I had the blue-books by me when I was writing I should have been more explicit in separating the Commission in which he acted as secretary from others that had preceded it. But, as it is, my words, reprinted in your own columns (*NATURE*, vol. xiv. pp. 440, 441), show that I spoke of it as something distinct from them, and so it truly was, for as Mr. Holdsworth himself says, it was "the most comprehensive investigation of the subject that had ever been made," and the evidence it collected is one of the most valuable contributions to applied zoology with which I am acquainted.

Next there comes up another point. It is quite compatible with an increased *supply* of fish that there may be an actual decrease in the *stock* of fishes, and it seems to me that my critic hardly sees the danger of confounding these two very different things. That the supply of fish to our markets has of late enormously increased may be indubitable—the question really is whether there are still in our seas as many fishes as there used to be. The evidence I have above analysed shows, I think, that there are not, and the recommendations of the Commissioners of 1863 are certainly not such as would increase the number.

Mr. Holdsworth asserts that "practical mischief is likely to result" from my opinions becoming known to fishermen. I wish he had been a little more careful to explain wherein the danger lies. Unless it be that the next Sea-Fisheries Commissioners may find their inquiries suddenly stopped by a well-placed torpedo, I am at a loss to imagine the risk. As, however, their permanent brethren of the Rivers Commission continue to pursue their duties without any such unpleasant consequences, I think the possible mischief must be over-rated. Mischief may arise, though, from the utterance of smooth sayings, and very great mischief too; but, if it does, it will not attach to those that utter the note of warning. My friend refers to his "Deep-sea Fishing and Fishing-boats," an excellent work in many respects, which fully deserves all that was said in its praise in your columns when it appeared (*NATURE*, vol. xi., p. 421), and perhaps more, for the reviewer did declare that the author's "inferences and his facts are very much at variance," which was perhaps going rather too far. I have carefully read it, but I fail to find there any new facts—new, I mean, since the publication of the blue-books before-mentioned—that bear out his views of the matter. On the contrary, I have met with several admissions which I think point in the opposite direction. Thus I read of Yarmouth (p. 111):—"The mackarel 'voyages,' however, have been so unprofitable during the last few years that there is little inducement to invest very largely in new gear for that fishery."

A little further on, of Lowestoft (p. 122) :—"Recent experience, however, does not support this statement" [that the summer fish are often as abundant as they ever were before the spring-fishery came into fashion], "as with a more or less successful series of spring fisheries, the summer herrings have been exceedingly scarce for the last seven years." Now neither Yarmouth nor Lowestoft are very small or unimportant stations. It would look, then, as if scarcity has begun to appear there. Again (pp. 214, 215), Mr. Holdsworth tells a very good story of the disappearance of herrings from the Guernsey waters; but he does not contradict the statement that there has been no herring-fishery there since the year 1830. Furthermore he says (pp. 266, 267) :—"Turbot or 'bratt' nets are successfully worked by the Staithes fishermen, although, according to their report, the catches are not nearly as large as they were formerly. This is the general statement along this coast. . . . It is a remarkable circumstance that nearly thirty years ago turbot became so scarce near North Sunderland, close to Holy Island, that the turbot-nets were given up. At that time trawling in the North Sea was only just beginning from Hull and that part of the coast; and the trawlers have never worked near the place where the decrease of turbot was said to have been greater than even at Staithes. It is evident, then, that we have a good deal to learn about what attracts or drives away the fish to or from any particular locality."

To this last remark I cordially agree, for in my address I said that the consideration of our fisheries is "fraught with unusual difficulties." But while we are satisfying ourselves on this and similar points, I cannot regard with the same complacency as Mr. Holdsworth the increasing outlay of capital in improved boats and fresh fishing-gear, the growing fish-traffic on the railways, or the glories of an enlarged and renovated Billingsgate, arising amid the pious ejaculations of its frequenters. Is that the only market which is to be unaffected by inflation? I derive little comfort in allowing my fancy to run riot over the marble slabs of Cheapside, Bond Street, and Arabella Row, teeming at present with every finny delicacy, and still less when I meet the humble barrow of the East-end costermonger, with its as plenteous and more odorific load. The question is, how long will that abundance last? Incalculably great as the stock of fishes in our seas may be, it must be subject to the same laws as the stock of every other animal. Directly the draughts upon it exceed its natural increase, it must dwindle. The time when that shall happen seems from the evidence before me to be imminent.

Some of Mr. Holdsworth's remarks appear to me irrelevant. I said nothing in my address about "spawning-beds," and therefore to have mentioned the discoveries of Prof. Sars and Herr Malm would have been little to the purpose. But if my friend meant to hint that I did not know that the spawn of some fishes floats in the water during its development, I will content myself by observing that my acquaintance with Scandinavian naturalists and their works began in the year 1855. His reference to the Sea Birds' Preservation Bill also seems to be wide of the mark. But I am sure ornithologists will be thankful to him for information that will show how many of the birds named in that Act commonly prey upon the sea-fishes that come to our markets, and which kinds they take. Perhaps he will also explain why the fishermen of our coasts were so strongly in favour of its being passed. Of the precise direction my efforts took towards that end Mr. Holdsworth, I think, cannot be aware.

ALFRED NEWTON

Magdalen College, Cambridge, November 3

P.S.—If the remarks I made in my address be well founded, they of course have a general bearing, and will apply to all cases of "over-fishing." Since I wrote the above I have received from my kind friend, Prof. Baird, the United States' Commissioner of Tides and Fisheries, his reports from 1871 to 1875. Therein I find the decrease of the Sea-Fisheries on the Atlantic coast of the United States treated as a fact beyond denial, and "over-fishing" unquestionably assigned as the chief cause of that decrease.

A. N.

November 14

The Foundation of Zoological Stations in Heligoland and Kiel

WILL you kindly permit me to say a few words in answer to the letter by which my friend Mr. Balfour expressed his view on the proposed foundation of zoological stations at Heligoland and Kiel.

Mr. Balfour has certainly not been well informed, when he believes the promoters of the future stations in Heligoland and Kiel had intended "to put aside claims of the zoological station at Naples in favour of the two new institutions." In the first place it is expressly stated in their Report that the committee are far from wishing to take away the least support from the Naples establishment. Besides, according to information which reached me some time ago, one of the most competent and influential members of the committee has only consented to act, if it is expressly stated in the memorandum to be handed over to Government, "that, should the empire limit its annual contributions to zoological stations to 1,000*l.* or 1,200*l.* (a sum asked at present for the zoological station at Naples), this sum ought to go *undivided* to the Naples establishment as the one of much greater importance. The foundation of the two northern stations ought in consequence to be deferred to later times."

Nothing more than this could be desired, and certainly the proposition once made, nothing more could be expected, and had Mr. Balfour been acquainted with the whole of the facts, I am satisfied he would never have applied the terms "unwise and ungenerous" to the proposition. He is, however, certainly right in maintaining that the Naples station has been the means of proving both the value and feasibility of such institutions, and perhaps nobody, besides myself, knows better than Mr. Balfour, how great and how numerous were the obstacles which had to be overcome. This and the fact that Mr. Balfour assisted me most generously and most vigorously during the whole of my struggle, entitles him fully to disapprove of what he thinks might possibly have a detrimental influence on the fate of the Naples establishment. With regard to this apprehension I may be permitted to state that there is well founded hope that the Naples station will soon be free from such embarrassments as are the consequence of insufficient means, and that I always expected and desired a series of zoological stations to spring up which should not only follow but even rival the original one started by myself. The sudden appearance of zoological stations on the Normandy coast, at Trieste, Sebastopol, the foundation of the late Anderson School of Natural History in the United States, the proposition to create two stations at Heligoland and Kiel, and another plan to erect a station on the White Sea, brought before the Association of Russian Naturalists in Warsaw, furnish indubitable proofs that my belief was well founded. It may be that too little circumspection has been used in founding or planning several of these institutions; nevertheless their great number and rapid augmentation justify me in giving to my establishment such dimensions and so distinct an international character as to carry it as far beyond competition as possible.

I hope to be able to enter more fully into the development of the Naples station in the Second Annual Report, which I think will be ready next spring. It will show that till now the station has not only not suffered from competition but has been increasing very considerably the range of its activity and influence on the progress of biology.

ANTON DOHRN

Berlin, November 5

The Deep-sea Manganiferous Muds

IN the very interesting Address delivered by Sir C. Wyville Thomson, at Glasgow, on the *Challenger* expedition, while referring to the "red clay" deposit so general over the deepest parts of the Atlantic and North Pacific, the remarkable fact is mentioned that the clay contains numerous nodules of peroxide of manganese, which in some places are found in great quantity.¹ The Address goes on to say :—"This is a phenomenon which we are as yet unable to explain, and I do not know that there is any analogous instance in any of the older formations" (*NATURE*, vol. xiv., p. 494).

It is possible that this can be accounted for in the same manner as the formation of the "red clay" itself, assuming that the explanation given by Sir C. Wyville Thomson is the correct one, as there can be but little reason to doubt. It is true that exception has been taken to it by Dr. Carpenter, who considers the "red clay" to be "a *post-mortem* deposit in the chambers of the foraminifera."² It does not clearly appear, however, where such a *post-mortem* pseudomorphic deposit could come from in this case, while, were that opinion correct, then the *Globigerina* ooze

¹ See also "Report to Hydrographer of the Admiralty on the Cruise of H.M.S. *Challenger*," Prof. Wyville Thomson, F.R.S., *Proc. Roy. Soc.*, vol. xxiv., p. 39.

² "Remarks on Prof. Wyville Thomson's Preliminary Notes on the Nature of the Sea-bottom," &c. *Proc. Roy. Soc.*, vol. xxiii., p. 244.